NASA Space Shuttle Workforce Transition Strategy

Pursuant to

FY 2008 Consolidated Appropriations Act (P.L. 110-161)

September 2011

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1.0 Overview

This is the Fourth Edition of the *NASA Workforce Transition Strategy*, first released as an Initial Report in March 2008. This report responds to direction in the *FY 2008 Consolidated Appropriations Act* (P.L. 110-161):

> *"The Administrator of the National Aeronautics and Space Administration shall prepare a strategy for minimizing job losses when the National Aeronautics and Space Administration transitions from the Space Shuttle to a successor human-rated space transport vehicle. This strategy shall include: (1) specific initiatives that the National Aeronautics and Space Administration has undertaken, or plans to undertake, to maximize the utilization of existing civil servant and contractor workforces at each of the affected Centers; (2) efforts to equitably distribute tasks and workload between the Centers to mitigate the brunt of job losses being borne by only certain Centers; (3) new workload, tasks, initiatives, and missions being secured for the affected Centers; and (4) overall projections of future civil servant and contractor workforce levels at the affected Centers. The Administrator shall transmit this strategy to Congress not later than 90 days after the date of enactment of this Act. The Administrator shall update and transmit to Congress this strategy not less than every six months thereafter until the successor human-rated space transport vehicle is fully operational."*

For 30 years, the Space Shuttle carried U.S. and international astronauts into orbit; played a key role in the construction, outfitting, and resupply of the International Space Station (ISS); serviced the Hubble Space Telescope five times; served as an Earth-orbiting laboratory through the Spacelab and SpaceHab missions; and deployed a diverse array of payloads, including science probes and research experiments (such as the Magellan mission to Venus and Earth-orbiting tether experiments), communications satellites, and even student projects. The ISS has now transitioned from the construction era to an operations and research era, with a six-person permanent crew, three major science labs, and an operational lifetime through at least 2020. Completion of ISS assembly represents a major achievement of the Space Shuttle. At the same time, completion of ISS assembly also marks the retirement of the Space Shuttle Program, for which NASA and its contractors have been planning for several years. This requires a significant transition to related but new work activities. NASA recognizes and is addressing both near-term issues associated with this transition and the longer-term requirement of ensuring that the human spaceflight team remains innovative, dynamic, and capable.

The final mission of the Space Shuttle Program is now complete. NASA had been focused on the safe fly-out of the Space Shuttle manifest and preparing the ISS for its post-assembly operations and utilization phase. NASA asked the Shuttle operations workforce–both civil service and contractors–to stay through the end of the Shuttle Program to safely complete the Shuttle's final mission. NASA has been preparing for Space Shuttle retirement since 2004, including ongoing activities to facilitate transition of both key NASA civil service employees and contractor employees to other programs. NASA Transition is the transition of people, property, processes, and plans to enable space exploration missions by evolving from the Space-Shuttle-based human spaceflight system to a new architecture that aligns with the *NASA Authorization Act of 2010* (P.L. 111-267).

This transition catalyzes the discussion of how to best utilize the ISS, and then where and how to continue the exploration of space; this discussion will drive the capabilities NASA will require and develop. The Agency now has an opportunity to call upon the human spaceflight community to bring forward new ideas for technological innovation and to build new operational capabilities. In the coming decades, the Agency and broader human spaceflight community must evolve to accomplish each new challenge. This means ensuring the civil service and contractor community have the core, critical skills for any and all upcoming human spaceflight missions. This also means challenging the community to seek out and demonstrate capabilities to make exploration beyond low Earth orbit (LEO) safer, more affordable, and achievable more quickly.

2.0 Transition Strategy

The *NASA Authorization Act of 2010* (P.L. 111-267) noted that "it is essential to the economic well-being of the United States that the aerospace industrial capacity, highly skilled workforce, and embedded expertise remain engaged in demanding, challenging, and exciting efforts that ensure United States leadership in space exploration and related activities."[1] It also directed that, "the [NASA] Administrator shall, to the maximum extent practicable, utilize workforce, assets, and infrastructure of the Space Shuttle Program in efforts relating to the initiation of a follow-on Space Launch System..."[2] NASA's workforce transition strategy aligns to the authorized program and mission content for new human spaceflight capabilities, employing transition processes already in place in support of the implementation strategy.

NASA is committed to a set of workforce transition goals, consistent with the *NASA Authorization Act of 2010*, the *National Space Policy of the United States of America* (June 2010), the *2011 NASA Strategic Plan*, and the *Human Capital Plan for Mission Execution, Transition, and Retirement of the Space Shuttle Program* (2006). These goals have remained relatively stable through the transition planning process from 2004 through today, and have guided workforce planning throughout the evolution of mission and program planning for human spaceflight.

NASA's Workforce Transition Goals

NASA's workforce transition goals include the following:

- Ensure a capable and committed workforce to fly the Space Shuttle safely until its retirement and to complete and outfit the ISS in a manner consistent with NASA's International Partner commitments.
- Enable the smooth transition of civil service employees from the Space Shuttle Program to new programs and opportunities in a way that balances the needs of the Agency and the employees.
- As appropriate, enable the transfer of relevant contractor workforce skills and knowledge to future programs and projects.

The completion of the Space Shuttle Program and the evolution of exploration to the emerging programs will have an impact on civil service and contractor workforce planning. NASA civil service personnel will have meaningful work to accomplish now that the Space Shuttle has been retired. Contractors will have new opportunities to partner with the Agency on the new exploration portfolio. In addition, as NASA proceeds

[1] *NASA Authorization Act of 2010* (P.L. 111-267), Section 2(6).
[2] *NASA Authorization Act of 2010* (P.L. 111-267), Title VI, Section 602(b)(1).

with the transition to the post-Space-Shuttle era, it must pursue more affordable programs. Key to that transition is that the role of civil service employees on human spaceflight programs will evolve. In addition to having a leaner oversight role in major system development, other members of the team will be deployed to conduct important longer-term, innovative, hands-on work. This work provides critical capability demonstrations and risk reduction for future affordability by strengthening and reshaping the civil service's technical capabilities and insights and provides NASA Centers with workforce transition options.

NASA's Workforce Transition Implementation Strategies and Tools

NASA began planning for Shuttle Transition and Retirement, including the workforce, in 2004. The Agency's and Program's workforce transition strategy and approach has remained largely consistent, with some modifications to reflect direction from the *NASA Authorization Act of 2010*. These efforts have been documented in:

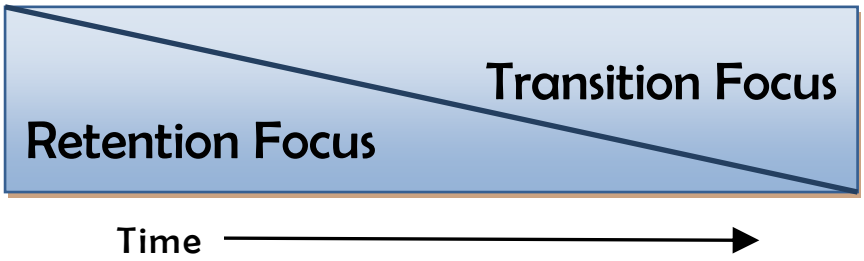
- *Human Capital Plan for Mission Execution, Transition, and Retirement of the Space Shuttle Program, April 14, 2006*
- *National Aeronautics and Space Administration Workforce Transition Strategy, Initial Report -- Space Shuttle and Constellation Workforce Focus -- March 2008*
- *National Aeronautics and Space Administration Workforce Transition Strategy -- Space Shuttle and Constellation Workforce Focus -- Biannual Report - Second Edition, October 2008*
- *NASA Space Shuttle Workforce Transition Strategy pursuant to FY 2008 Consolidated Appropriations Act (P.L. 110-161), July 2009 Update*
- *Workforce Transition Whitepaper, Status of Activities, June 2010*

NASA Centers and contractors have tools and processes available to facilitate the transition of mission support activities from Shuttle to new project areas. In order to maintain a healthy and balanced workforce across NASA Centers, the Agency is focused on retaining and developing knowledge and skills in the civil service and contractor workforce as appropriate and rebalancing the cadre of skills in the civil service population through attrition and hiring. The Agency facilitates transitions for contract employees who can no longer be supported based on the Agency's work portfolio via relationships with local and national Government and private sector entities.

As the Agency transitions the civil service workforce, there are underlying concepts that drive the use of Human Capital tools. The Agency is reassigning civil service employees to new work as it becomes available, pending the specifics of work set forth in the *NASA Authorization Act of 2010*. Further, the Agency and Centers will provide ongoing support for employees in transition through training, developmental assignments, communications, counseling, etc.

For the contractor workforce, **s**ome Shuttle contractors are being retained following the last Shuttle flight for Shuttle Transition and Retirement work. Some Center-based support services contractors will remain in place in order to ensure continuity and continued access to needed expertise that aligns with Mission Directorate workforce needs. However, the number of Shuttle contractors has been, and will continue to be, significantly reduced in an orderly fashion consistent with completed Space Shuttle Program milestones. Contractors for new commercial and in-house programs—as well as for programs associated with the new exploration architecture—are in the process of being selected. It is anticipated that these selections will ultimately lead to new work for some of the displaced contractor employees. To assist the impacted workforce (and their communities) in the meantime, NASA continues to provide a range of transition assistance. For example, the Human Resources Offices at the human spaceflight Centers are collaborating closely with the local workforce boards and contractor companies to provide resources and job fairs. In addition, they provide workshops and sessions on how to apply for Federal positions.

The specific tools used vary from place to place, as each situation is unique. The following model illustrates the range of tools and strategies available to NASA, the Space Shuttle and emerging programs, and the contractor community.



Retention
- Retention Pay
- Developmental Opportunities (Technical and Leadership)
- Workforce sharing (matrix management, rotations, job sharing)

Cross-Cutting
- Communication
- Increased training opportunities (technical and leadership)
- Enhanced Supervisory Training (e.g., listening skills, communication, feedback)
- Employee recognition
- Partnerships across the Centers, Contractors, and Communities

Transition
- Job seeking training and Counseling (e.g., resume writing, interviewing, use of social media)
- Career Counseling
- Resources and Job Fairs
- Opportunities to update skills
- Opportunities in new programs
- Agency Transition Tool

Measures
- Employee Surveys
- Confidence Survey of Civil Service Supervisors
- Attrition Rates

Sections 5 and 6 of this report describe how the contractors and the Centers are using these tools. In addition, Section 5 describes the work of the Space Shuttle Transition Liaison Office (SSTLO), which was designed to assist local communities affected by the termination of the Space Shuttle Program by offering nonfinancial, technical assistance to the identified communities and to identify services available from other Federal, State, and local agencies to assist in such mitigation.

3.0 Background

"Finish Strong"

The final mission of the Space Shuttle program landed at Kennedy Space Center in Florida on July 21, 2011. The Space Shuttle team had been determined to "finish strong" and did so with pride and honor. With their eyes always on making sure the final missions flew safely, the teams completed the final manifest of challenging missions. In 2011, these missions brought important science payloads (such as the Alpha-Magnetic Spectrometer), supplies, logistics, and new modules up to the International Space Station.

NASA has been preparing for Space Shuttle retirement since 2004, including conducting ongoing activities to facilitate the transition of NASA civil service and contractor employees to other programs. NASA Transition involves people, property, processes, and plans to enable space exploration missions by evolving from Space-Shuttle-based human spaceflight to a new architecture.

NASA is also working to ensure a transition of those elements of the Constellation Program, including the workforce, that are necessary for the newly authorized exploration capabilities. The *NASA Authorization Act of 2010* states that, "in developing the Space Launch System pursuant to section 302 [of the Act] and the multi-purpose crew vehicle pursuant to section 303 [of the Act], the Administrator shall, to the extent practicable utilize… existing contracts, investments, workforce, industrial base, and capabilities from the Space Shuttle and Orion and Ares 1 projects..."[3]

History of Space Shuttle Transition

NASA increased the scope of its planning for the orderly transition of the Space Shuttle Program in 2005 and 2006, putting in place the transition governance structure, facility and personal property disposition plans, and the workforce transition plan. The initial workforce transition plan was documented in the 2006 *Human Capital Plan for Mission Execution, Transition, and Retirement of the Space Shuttle Program.* The final configuration of the ISS was established at this time, and the Shuttle manifest was defined for the remainder of the Space Shuttle Program.

From 2006 through 2009, NASA put in place the elements of transition and established its internal communications processes and tools for the affected workforce. Annual surveys of the Space Shuttle civil service and contractor workforce have helped NASA leadership monitor trends and refine communications and incentive activities aimed at retaining critical workforce capabilities. These surveys have indicated that communication is the key to managing the workforce during transition. NASA and its prime contractors are engaged in a robust communications effort at all levels to ensure that the workforce is kept informed of current programs and future plans. In late 2006, NASA established *Rendezvous* magazine as the official internal means to communicate transition planning news. *Rendezvous* magazine, its associated website, newsletters like *SSP News*, and talking points for managers to use in conveying key information to their employees, have provided the foundation for keeping the team informed. In 2007 and 2008, NASA and its prime contractors negotiated retention plans to ensure that the necessary levels of critical skills would be maintained through the end of the Shuttle Program.

Starting on May 1, 2009, NASA began the drawdown of production and manufacturing personnel. While production assets (people, hardware, tools) were ramping down, most Shuttle engineering and operations capabilities were maintained to support the program through the last mission. By the end of 2010, the Space Shuttle production and manufacturing workforce had completed the flight hardware elements for the remaining Space Shuttle flights and the testing of these elements.

[3] *NASA Authorization Act of 2010* (P.L. 111-267), Sec. 304.

In 2009, NASA established the Space Shuttle Transition Liaison Office (SSTLO) in response to direction in the *NASA Authorization Act of 2008* (P.L. 110-422). The SSTLO is described in more detail in Section 5 of this report.

In 2010, the Presidential Task Force on Space Industry Workforce and Economic Development was commissioned[4] to examine workforce retraining and economic development initiatives for Florida's Space Coast across Federal Government agencies, in partnership with other state and local governments and affected communities. The Task Force provided these recommendations in its August 2010, report.[5]

- **Sustain Regional Investments Already Underway** by continuing to support recent investments in the region made through retraining programs, SSTLO activities, American Recovery and Reinvestment Act funding, and other Government programs.
- **Spur Immediate Opportunity** by creating additional immediate employment opportunities and economic activity in and around the Space Coast.
- **Invest in Smart Economic Growth Initiatives through a New Competitive Fund** through a fast-track competitive grant process to maximize the impact of remaining transition assistance funding from the Federal Government.
- **Build Lasting Infrastructure for Success** through the Taskforce on Advancing Regional Innovation Clusters, which includes SBA as well as the Departments of Labor, Education, and Commerce.

In 2011, the Space Shuttle operations workforce successfully completed the final Shuttle flights and now a reduced team will be conducting the post-flight processing. The ISS workforce prepared the final payloads to be brought to the ISS aboard the Space Shuttle and began to transition to a resupply model centered on U.S. commercial providers and NASA's International Partners. Research aboard the ISS is also accelerating, especially with a full complement of six crew members and the designation, in 2005, of the U.S. segment of the ISS as a National Laboratory. The Constellation Program had been proceeding, with priority placed on activities that have maximum potential use on newly authorized exploration activities[6]. In addition, as of April 2011, the Constellation Program began planning for the transition of its activities using the transition processes and tools already in place[7].

Moving Forward

NASA's Space Operations and Exploration Systems mission directorates lead the Nation's current and future human space exploration efforts while encouraging development and growth of a commercial launch capability. The FY 2012 Budget request for the Space Operations Mission Directorate (SOMD) is $4,346.9 million and the request for the Exploration Systems Mission Directorate (ESMD) is $3,948.7 million.

Effective August 12, 2011, NASA merged SOMD and ESMD into a new mission directorate, the Human Exploration and Operations Mission Directorate (HEOMD). The new, integrated organization will be able to more effectively implement NASA's human spaceflight goals to achieve a safe, reliable, and affordable program that will sustain human space exploration efforts over the long term. By combining the efforts of these two human spaceflight organizations, NASA will ensure that knowledge and lessons learned from

[4] Presidential Memorandum of May 3, 2010.
[5] *Report to the President*, August 15, 2010, http://www.nasa.gov/offices/spacecoasttaskforce/home/index.html
[6] As per the provisions of Division B, Title III, National Aeronautics and Space Administration, Exploration, in the *Consolidated Appropriations Act of 2010* (P.L. 111-117)
[7] As per the provisions of the *Department of Defense and Full-Year Continuing Appropriations Act, 2011* (P.L. 112-10), Sec. 1333(b).

current Space Shuttle and ISS activities and contracted services (Space Operations) are leveraged with the Agency's forward-looking engineering design and capabilities development (Exploration Systems). Benefits of the unification will include integrated commercial transportation programs for the ISS; simplified external relationships with industry and international partners (including integrated global cooperation in human space exploration); and streamlined internal efforts among NASA Centers for more efficient operations. The new organization will realize improved human capital and infrastructure management as NASA transitions from the Space Shuttle and Constellation systems to new human spaceflight programs. Restructuring the current budget will be evaluated and proposed, if appropriate, in a future NASA budget request.
The new organization combines the talents, skills and experiences of the two previous Directorates. It more fully integrates the operation of NASA's in-space assets and current capabilities with planning for the Agency's future, including the size and type of the work force, facilities and contracts.

Prior to this reorganization, SOMD oversaw NASA's operational space capabilities, including the (now retired) Space Shuttle, ISS, Commercial Resupply Services, Launch Services, Space Communications and Navigation, and Rocket Propulsion and Test programs. ESMD developed the systems and capabilities required for the human exploration of space beyond LEO, and for U.S. crew access to ISS after retirement of the Space Shuttle. These systems and capabilities developed by ESMD include launch and crew vehicles for missions beyond LEO, affordable commercial crew access to the ISS, basic life and physical sciences research aboard the ISS, technologies and countermeasures to keep astronauts healthy and functional during deep space missions, technologies to reduce launch mass and the cost of deep space missions, and advanced human spaceflight capabilities required to implement the U.S. Space Policy. NASA's goals are consistent with the *NASA Authorization Act of 2010*, which calls for expanding permanent human presence beyond LEO to destinations such as the surface of the Moon, near-earth asteroids, and Mars, while maintaining uninterrupted U.S. human spaceflight capability in LEO and beyond.

As NASA continues Space Shuttle Transition and Retirement activities in FY 2012, the Agency is transitioning key workforce, technology, facilities, and operational experience to a new generation of human spaceflight exploration activities. The Space Shuttle completed its last mission on July 21, 2011. The disposition of property and capabilities no longer needed for safe mission execution has been underway for some time. However, the completion of the manifest later in FY 2011 than originally planned has required the Shuttle Program to reevaluate the final completion date, with some disposition activities moving into FY 2013.

In FY 2012, NASA will continue architecture planning for a Multi-Purpose Crew Vehicle (MPCV) capable of taking human explorers to distant locations throughout the inner solar system. The Space Launch System (SLS) Program will develop the heavy lift vehicle that will launch the MPCV, other modules, and cargo for these missions. NASA will also continue to stimulate the development of commercial crew and cargo transportation systems to the ISS and other LEO destinations. The Administration supports enabling this new industrial market, as it will provide a realistic solution to the challenges of acquiring affordable and reliable access to space.

The FY 2012 Budget request provides for the Advanced Exploration Systems (AES) Program that develops and demonstrates prototype systems for life support, habitation, and Extravehicular Activity (EVA, i.e., spacewalks) that will enable NASA to conduct future human missions beyond LEO, while reducing risk and lifecycle cost. AES will focus on advanced development of flight system concepts. This includes a Deep Space Habitat, where the crew would live during transit on long missions, and a Space Exploration Vehicle that would allow the crew to closely approach an asteroid, explore its surface, and conduct EVAs. AES will demonstrate these systems in ground test beds, Earth-based field and underwater tests, and ISS flight experiments. AES will use innovative approaches for the rapid development of system concepts, such as small, focused teams of NASA engineers and technologists working with industry partners to gain hands-on experience. AES will pilot these processes to improve the affordability of future exploration programs.

4.0 Workforce Projections

This report includes the workforce levels for the Space Shuttle Program, the Constellation Program, and the newly authorized Human Exploration Capabilities (HEC) programs: the SLS and the MPCV. The Space Shuttle Program's Transition and Retirement effort is ramping up with the safe and successful conclusion of the final Space Shuttle flight, STS-135, and these activities will extend into FY13. The civil service workforce on the current programs is transitioning to the HEC programs as well as other human spaceflight programs, such as AES, and to activities such as those of the NASA Chief Technologist.

Table 1 provides specific annual civil service and contractor workforce projections for the four human spaceflight Centers that are most affected by the transition. Table 2 provides similar data for the other NASA Centers. It should be noted that the Center estimates in Tables 1 and 2 include all work managed by that Center, including work performed at off-site contractor facilities (for example, Marshall Space Flight Center (MSFC) figures in Table 1 include work performed at Michoud Assembly Facility (MAF) in Louisiana, ATK in Utah, and Pratt & Whitney Rocketdyne in Florida).

NASA's projections for Center civil service and contractor workforce levels are based on current estimates of programs' civil service full-time equivalent (FTE) and contractor work-year equivalent (WYE) requirements. FTE and WYE are standard human capital measures, and are calculated based on the total number of hours that civil service personnel or contractors are charging directly to a project or program in a fiscal year. FTE and WYE numbers are not headcounts, and should not be read as a count of the number of individual employees working for a project or program. For example, a civil servant may split time between two programs, in which case the two programs would each count the percentage of that employee's time as part of their total FTE count.

NASA has assigned host Centers for the activities of the HEC programs, which are the basis for the initial workforce projections. NASA's Johnson Space Center (JSC) in Texas will host the MPCV Program Office responsible for developing the MPCV. JSC also will continue to lead the way in human research to enable exploration beyond LEO. This research heavily leverages the work onboard the ISS. In addition, JSC will be critical to efforts to facilitate commercial access to LEO. NASA's Kennedy Space Center (KSC) in Florida will lead the way in enabling commercial human spaceflight capabilities and host the Commercial Crew Program Office dedicated to that work. KSC will continue to provide launch services to both science missions and commercial crew providers. MSFC in Alabama will lead NASA's efforts on a heavy-lift rocket that will carry humans beyond LEO. The Center will house the SLS Program Office for the heavy-lift development and continue to support Station operations.

NASA continues to mature its understanding of the FTE and WYE breakdown by programs and Centers, and will update these data accordingly as those estimates are refined.

Table 1 - The Space Shuttle and Human Exploration Capabilities Workforce

	FY10 (Actuals)		FY11 (Estimates)		FY12		FY13 - Notional	
	CxP	SSP	CxP/HEC	SSP	HEC	SSP	HEC	SSP
Nationwide								
FTE	2,540	1,230	2,290	1,040	---	190	---	110
WYE	6,030	9,480	5,390	5,500	---	960	---	440
Kennedy Space Center (KSC)								
FTE	400	440	330	450	---	100	---	50
WYE	330	4,850	550	2,860	---	520	---	230
Johnson Space Center (JSC)								
FTE	640	470	580	370	---	50	---	30
WYE	2,780	3,030	2,410	2,020	---	280	---	110
Marshall Space Flight Center (MSFC; includes Michoud Assembly Facility)								
FTE	850	280	810	200	---	40	---	30
WYE	2,340	1,570	2,010	600	---	150	---	110
Stennis Space Center (SSC)								
FTE	30	10	40	0	---	0	---	0
WYE	180	30	230	20	---	10	---	0

Legend for data in table cells:	Values are notional	--- Values are pending HEC planning

Key Points and Acronyms

- The table does not reflect HEC architectural and acquisition planning for the SLS and MPCV and the associated WYE. The table will be updated in the next edition of this report.
- CxP – Constellation Program
- SSP – Space Shuttle Program
- HEC – Human Exploration Capabilities
- FTE – Full-Time Equivalent (Government human capital measure)
- WYE – Work-Year Equivalent (Contractor human capital measure)

Basis of Estimates

- Data are rounded to the nearest ten.
- The FY 2010 FTE and WYE values are actuals.
- The FY 2011 FTE and WYE values are estimates for the actual workforce levels, based on averages from October 2010 through June 2011.
- The FY 2012 FTE estimates for Shuttle are based on initial allocations of civil service personnel to conduct the transition and retirement activities in the President's FY 2012 Budget Request. The FY2012 levels for FTE for HEC are in the process of being determined as part of the budget formulation process.
- For FY 2012 and FY 2013, SSP WYE estimates are for SSP transition and retirement activities. Levels shown are preliminary and will be revisited as part of the Agency FY13 budget formulation process.
- MFSC WYE estimates include off-site labor at Michoud Assembly Facility (Louisiana), ATK (Utah), and Pratt & Whitney Rocketdyne (California) that are managed by MSFC.
- KSC WYE estimates includes United Space Alliance work performed in Florida (Solid Rocket Booster, Ground Processing, and portions of the Orbiter workforce).

Table 2 - The Space Shuttle and Human Exploration Capabilities Workforce, All Centers

	FY10 (Actuals)		FY11 (Estimates)		FY12		FY13 - Notional	
	CxP	SSP	CxP/HEC	SSP	HEC	SSP	HEC	SSP
Nationwide								
FTE	2,540	1,230	2,290	1,040	---	190	---	110
WYE	6,030	9,480	5,390	5,500	---	960	---	440
Ames Research Center (ARC)								
FTE	100	20	80	10	---	0	---	0
WYE	60	30	60	0	---	0	---	0
Dryden Flight Research Center (DFRC)								
FTE	50	0	40	10	---	10	---	0
WYE	60	30	10	10	---	0	---	0
Glenn Research Center (GRC)								
FTE	230	10	210	0	---	0	---	0
WYE	140	0	70	0	---	0	---	0
Goddard Space Flight Center (GSFC)								
FTE	20	0	10	0	---	0	---	0
WYE	10	30	0	0	---	0	---	0
Langley Research Center (LaRC)								
FTE	210	10	200	0	---	0	---	0
WYE	130	10	40	0	---	0	---	0

Key Points and Acronyms

- The table does not reflect HEC architectural and acquisition planning for the SLS and MPCV and the associated WYE. The table will be updated in the next edition of this report.
- CxP – Constellation Program
- SSP – Space Shuttle Program
- HEC – Human Exploration Capabilities
- FTE – Full-Time Equivalent (Government human capital measure)
- WYE – Work-Year Equivalent (Contractor human capital measure)

Basis of Estimates

- Data are rounded to the nearest ten.
- The estimation methodology is the same as that used for Table 1.

NASA civil service personnel will not be laid off as a result of the Space Shuttle Program ending, but will take on new assignments or leave the Agency through early retirement/separation incentive (VERA/VSIP) authorities. There currently are about 1,100 FTE NASA employees charging their time to the Space Shuttle Program, down from 1,800 FTE in 2006. Contractors continue to pursue internal placements of their employees. As of June 2011, the number of contractor employees supporting Shuttle was about 5,000 WYE, down from 14,000 WYE in 2006. Extensive contractor placement efforts and other voluntary attrition mean that not all employees who have left the Space Shuttle Program have been involuntarily laid off.

5.0 Contractor Transition Plan

NASA's workforce—contractor and civil service—is vital to the success of Agency mission and goals. Recognizing that the planned retirement of the Space Shuttle Program would impact the workforce, the Agency, Shuttle Program, and the Space Shuttle prime contractors have worked closely together to develop and implement a range of tools and strategies to help safely manage operations through retirement.

Since many of the tools and strategies are common to both the contractor and civil service workforces, the contractors and Government have worked very closely to develop and share retention and transition tools and strategies. However, it is important to note that while NASA directly plans and controls its civil service workforce, the Agency does not determine the personnel levels for, or directly manage, the contractor workforce. Instead, NASA purchases the products and services contractors provide as part of the national human spaceflight workforce and aerospace industrial and supplier base.

As NASA completed the final flight of the Space Shuttle, the focus and commitment of the workforce to finishing strong was inspiring. Voluntary attrition in the contractor workforce was well below what would be expected at that point in the Shuttle Program. In addition, the performance of the flight hardware met or exceeded expectations. For example, the number of reported in-flight anomalies on the last three flights was well below average, and the workforce injury rate was low and stayed steady. And the astronauts returning from recent missions complimented the Shuttle workforce on "how clean the vehicle was," referring to the low number of in-flight anomalies and how smoothly the vehicle and its systems operated during the mission.

These accomplishments were achieved at the same time the Space Shuttle contractors reduced their workforce, as production, support and operations milestones associated with the last flights were completed. Since FY 2006, the Shuttle prime contractor workforce has been reduced from 14,000 to approximately 5,000 (as of June 2011). In the past, most of the drawdown activity took place through normal workforce attrition -- primarily by not backfilling positions that became vacant through retirements, reassignments, or other kinds of voluntary separations. Starting in mid-2009, as more production milestones were completed, contractors began increasing the numbers of layoffs, with many of the initial candidates self-nominating to take advantage of separation incentives.

Retention Strategies

Circumstances related to transitioning employees vary for each of the Space Shuttle contractors. Some have other programs/projects available to their employees (whether locally or in another state), and others do not. In addition, economic conditions vary from location to location. As a result, each contractor developed a comprehensive retention plan tailored to its unique circumstances. While many of the tools are similar, the specifics of the tools and how they are used vary based on the situation. All prime contractors used some type of retention pay to retain critical skilled employees through their last need date. In addition, they offered enhanced supervisor training to improve leadership skills, career development counseling, and opportunities for retraining or cross training. Also, the contractors increased their communication with employees—from sharing information about internal business development activities to the latest news about NASA activities to expressing appreciation to employees for a job well done. As a result of these activities and economic slowdowns across the country, the voluntary attrition rate for the prime contractors decreased or remained flat. In addition to those contractor employees who were required until the end of STS-135, some Shuttle contractors will be retained following the last Shuttle flight for work on Shuttle Transition and Retirement. Other Center-based support services contractors will remain in place in order to ensure continuity and continued access to needed expertise.

Transition Activities

As milestones were met, the companies shifted from focusing on retention to helping employees transition to the future. Companies continue to assist their employees as they look for opportunities within the company—either locally or in another geographic area. In addition, companies offer (directly or through "Workforce Solutions" organizations) a range of job-seeking training and assistance, such as resume writing, interviewing skills training, career counseling, computer access, and career fairs. The companies are partnering with their local workforce boards not only for job-seeking assistance, but for technical training opportunities. These range from updating skills to obtaining certifications in a completely different area. Further, companies and/or communities are offering resource fairs which include access to local colleges and universities, Government agencies, and social service organizations.

Each company is responsible for identifying and notifying the affected employees of any workforce reduction, as well as deciding on the appropriate timing of the reduction. Notifications have been provided under the terms of the Worker Adjustment and Retraining Notification (WARN) Act. NASA does not issue WARN Act notifications; contractors issue them in compliance with provisions of the WARN Act. Not all involuntary reductions meet the criteria of the WARN Act requiring such notifications, so other means of notification have been used.

Space Shuttle Transition Liaison Office (SSTLO)

In 2009, NASA established the SSTLO in response to direction in the *NASA Authorization Act of 2008* (P.L. 110-422, Sec. 613). The Agency was directed to assist local communities affected by the termination of the Space Shuttle Program by offering nonfinancial, technical assistance to the identified communities and to identify services available from other Federal, State, and local agencies to assist in such mitigation. Specifically, the Office:

- Serves as a clearinghouse by gathering and disseminating information to the affected communities about opportunities available through other Federal, State, and local agencies; and,
- Serves as a key point of contact for the community beyond NASA for information about how the Agency is working with local communities to provide nonfinancial, technical assistance during transition.

When establishing the office, NASA chose to build on existing networks and working groups already established within the Space Shuttle Program. This virtual office consists of representatives from NASA's Office of Human Capital Management, SOMD and ESMD, the Space Shuttle Program, the human spaceflight Centers, contractor companies, and community organizations (see Appendix A for a list of some participating organizations). At early meetings, senior NASA Transition Managers spoke about the status of NASA programs and activities, the States of Florida and Louisiana shared their best practices, and the SSTLO shared information on available and proposed American Recovery and Reinvestment Act grants. Participants at the meetings came from a number of organizations, including NASA Headquarters, the NASA human spaceflight Centers, Shuttle prime contractors, and state and local organizations in communities affected by Shuttle retirement.

To identify applicable resources and build partnerships with other Federal agencies, members of the SSTLO:

- Met and briefed the Administrator of the Employment and Training Administration, Department of Labor; held a follow-up briefing with some of her Division Managers; and shared key points of contact.
- Briefed senior managers at the Economic Development Administration in the Department of Commerce and shared key points of contact.
- Informally benchmarked with the Office of Economic Adjustment, Department of Defense.

These meetings led to communication at the state and local level among the workforce and economic development agencies and the affected companies and communities.

2010 Accomplishments

The SSTLO used a variety of mechanisms to disseminate information to the affected communities, such as periodic telecons, a website, e-mails, and face-to-face meetings. Information shared included updates on NASA activities and plans; best practices and status from the communities, Centers, and contractors; and information from Federal agencies on their grants and programs. For example, the SSTLO hosted three face-to-face meetings in 2010:

In January 2010, the SSTLO hosted the first face-to-face Technical Interchange Meeting (TIM) for representatives from the human spaceflight Centers, Shuttle prime contractors, the affected communities, and state agencies (workforce and economic development). The participants received overviews of:

- Current NASA programs and plans;
- The Manufacturing Extension Partnership at the National Institute of Standards and Technology within the Department of Commerce;
- The Economic Development Administration within the Department of Commerce;
- The workforce planning and implementation process the Department of Defense uses during a base closure (from a representative of the Office of Economic Adjustment); and
- Current status and best practices from a number of the affected communities.

The June meeting highlighted the workforce and economic development efforts underway in the Space Coast Florida area. In addition, the participants received updates/overviews of:

- Current NASA programs and plans;
- Employment and Training Administration, Department of Labor;
- Small Business Administration;
- Economic Development Administration, Department of Commerce;
- Strategic Planning and Business Development Office, Kennedy Space Center; and
- The Manufacturing Extension Partnership at the National Institute of Standards and Technology, Department of Commerce.

The November meeting highlighted the workforce and economic development activities and partnerships in the Houston, Texas area. In addition, the group heard from a representative of the Presidential Task Force charged with assisting Florida with economic plans as a result of the impacts of the retirement of the Space Shuttle Program. Also, all of the communities shared their current status and best practices.

After the first face-to face meeting, the SSTLO developed and implemented a web-based Community of Practice, which includes all of the briefings and information and serves as a discussion forum and way to share information.

Other activities included:

- Supporting the work of the Presidential Task Force on Space Industry Workforce and Economic Development;

- Participating in community impact discussions in Brigham City, Utah; Las Cruces, New Mexico; and Houston, Texas;
- Working with other Federal agencies that may be interested in the skills of the Shuttle workforce;
- Briefing the Taskforce for the Advancement of Regional Innovation Clusters (TARIC), which strives to advance the regional innovation cluster (RIC) initiative by coordinating and leveraging Federal resources to support the growth of existing RICs and promote the establishment of new RICs. This group will be responsible for assisting other states affected by Shuttle retirement;
- Keeping up with the status of the communities, Centers, and companies affected by Shuttle retirement;
- Communicating information on NASA programs and activities;
- Building and maintaining relationships with the Department of Commerce's Economic Development Administration, and Manufacturing Extension Partnership at the National Institute of Standards and Technology; Employment and Training Administration, Department of Labor; Office of Economic Adjustment, Department of Defense.

2011 Plans

In calendar year 2010, the prime contractors supporting the Space Shuttle Program laid off over 3,000 employees across the country (additional support and sub-contractors were also affected). With the end of the Shuttle Program in 2011, the remaining prime contractor workforce of approximately 5,500 employees is being impacted. While not all of these employees will be laid off—some will be able to transfer to other programs or other parts of their companies—the SSTLO anticipates a large percentage will be laid off. The focus of the SSTLO will continue to be on both workforce support and economic development, including:

- Working with the Office of Personnel Management and the Human Resources Office at the Kennedy Space Center to support a Federal Government Virtual Job Fair, plus a Career Fair in Florida (July 26, 2011);
- Hosting face-to-face meetings highlighting best practices, Federal programs, and opportunities for the communities to partner;
- Using bi-monthly telecons as opportunities to share information on Agency programs, address issues, and provide status updates from the communities, Centers, and companies;
- Continuing to support the activities started by the Presidential Task Force on Space Industry Workforce and Economic Development in Florida;
- Maintaining relationships with the Taskforce for the Advancement of Regional Innovation Clusters, as well as Department of Labor, Department of Commerce, Manufacturing Extension Partnership, and Small Business Administration; and
- Staying connected with the state and local agencies and organizations supporting workforce and economic development initiatives.

Contractors for new commercial and in-house programs—as well as for programs associated with the new exploration architecture—are in the process of being selected. It is anticipated that these selections will ultimately lead to new work for some displaced contractor employees.

6.0 Civil Service Transition Plan

To help the civil service employees impacted by the retirement of the Space Shuttle Program, the Agency, Centers, and Shuttle Program have been working closely together to plan the transition and prepare the workforce for this change in their work assignments. The civil service workforce will remain roughly the same size in the next few years. No layoffs of civil service workforce are planned. Instead, civil service employees are being reassigned to new work pending the specifics of work set forth in the *NASA Authorization Act of 2010*. As with any major change, the planning and eventual execution occurs at many levels. For example, the Centers are supporting the workforce transition at the individual level through increased communication, one-on-one support, matrix management, rotations/details, and training and development (Appendix B provides a list of workforce tools). In addition, the Agency, Centers, and emerging programs are working to define the new workforce requirements and prioritize organizational core capabilities. NASA will offer buyouts and voluntary early retirement opportunities to target areas where the Agency's capabilities can be reshaped through new hiring.

Training and Development

To support the workforce through transition, Centers are employing a range of training and development tools. For example, all have delivered training on career development, transition, and resume writing and interviewing skills. Centers have also held retreats for affected employees. Besides career planning, these retreats typically include sessions on goal setting, training resources, promotion guidelines, and the work of other organizations at the Center.

To enhance technical skills, the Centers have focused on increasing opportunities for employees to participate in programs such as systems engineering or program/project management development programs, and have offered additional opportunities for technical training. In addition, to build crossover skills for employees, NASA has made a concerted effort to share civil service and contractor workforce (as appropriate) across the programs. This workforce synergy enables other programs to make progress, while ensuring the continuing availability of the critical skills necessary to safely and efficiently execute the final Space Shuttle missions and subsequent closeout activities. NASA is providing the tools, training, and time for civil service and contractor workers to gain experience and skills on new processes. This hands-on experience will increase employee familiarity with the new techniques and qualify them for future work.

Communication

Critical to any transition effort is effective and timely communication. In order to address the many transition implications to the workforce, the Agency, Shuttle Program, Centers, and contractors have set up several communication tools and channels. For example, the Centers have workforce transition websites which provide information about changes at the Center and how it impacts the workforce. There are sections geared to specific audiences, such as a page designed for contractor-related transition messages and events (community resources, events, classes, links to online training and books related to job searches). Manager sections provide messages, tools and resources for managers to have detailed transition-related conversations with their employees. Other tools include:

- Local Workforce Board Transition websites offer step-by-step preparation processes for job transition as well as information, resources and events for current and former aerospace employees. These public websites are updated frequently with items such as calendar of events, special offerings at the Transition Center, archives of previous presentations, links to regional educational providers, newsletters, helpful blogs, financial aid information, and other resources.

- Regularly scheduled first-line supervisor meetings and supervisor talking points created by senior leadership and Human Resources.
- Regularly scheduled updates to all on-site employees (all-hands meetings and transition panels open to all workers).
- Change management, communication and transition courses and "brown bag" lunches for both supervisors and employees.

Surveys/Feedback

Annual surveys of the Space Shuttle civil service workforce helped NASA leadership monitor trends and refine communications and incentive activities which were aimed at retaining critical workforce capabilities through the end of the Shuttle Program. The Space Shuttle Program also conducted a series of surveys of civil service supervisors. The aims of this survey were to measure: 1) supervisors' perceptions of the effectiveness of workforce sharing, and 2) supervisors' confidence in their ability to support the Space Shuttle Program with their civil service and contractor workforce. Survey data have provided critical information to Shuttle transition managers by informing management about employee morale and providing key indicators to the timing and deployment mechanism for retention tools and communications for affected workforce members.

Workforce Management Systems

In order to support the transition of each Shuttle employee, NASA developed a Workforce Transition Tool (WTT) to plan, track, and report the complete transition of Shuttle employees to new work within the Agency. The baseline data in the Tool include relevant planning information about each Shuttle employee (including those who charge only a portion of their time to the Space Shuttle Program), such as percentage of work time devoted to Shuttle and the date on which each employee's Shuttle assignment ends. Workforce planners and managers build on these baseline data to develop follow-on assignment plans for the Shuttle employees. These plans ensure that each employee will have follow-on work associated with new or existing programs and projects to cover all of the work hours that are freed up on the day his or her Shuttle assignment ends. In addition, the reorganization planning capability in the Tool facilitates organizational changes to support NASA's new missions. The WTT also has a capability for posting lateral job opportunities that empowers employees to find their own post-Shuttle work in a transparent manner. Data on the status of the planning process and of actual transition of employees from Shuttle to work on new projects are collected in the Tool and reported in a manner that ensures that the process is well-controlled and transparent to Agency and Center leadership.

7.0 Summary

The completion of the final flight of the Space Shuttle Program on July 21, 2011 positions the ISS well to begin an era of productive on-orbit research. This marks the retirement of the Space Shuttle, for which NASA and its contractors have been planning for several years. This requires a significant transition to related but new work activities. NASA recognizes and is addressing both near-term issues associated with an efficient transition and the longer-term requirement of ensuring that the human spaceflight team remains innovative, dynamic, capable, and affordable.

The completion of the Space Shuttle Program and the evolution of exploration to the emerging programs will have an impact on civil service and contractor workforce planning. NASA civil service personnel should feel secure that NASA has meaningful work for them to accomplish now that the Space Shuttle has been retired. Contractors will have new opportunities for them to partner with the Agency on the new exploration portfolio. In addition, as NASA proceeds with the transition to the post-Space-Shuttle era, it must pursue more affordable programs. A key to that transition, the role of civil service employees on human spaceflight programs, will evolve. In addition to having a leaner oversight role in major system development, other members of the team will be deployed to conduct important longer-term, innovative, hands-on work. This work provides critical capability demonstrations and risk reduction for future affordability, by strengthening and reshaping the civil service's technical capabilities and insights, and provides NASA Centers with workforce transition options.

This transition catalyzes the discussion of how to best utilize the ISS, and then where and how to continue the exploration of space; the discussion will drive the capabilities NASA will require and develop. The Agency now has an opportunity to call upon the human spaceflight community to bring forward new ideas for technological innovation and to build new operational capabilities. In the coming decades, the Agency and broader human spaceflight community must evolve to accomplish each new challenge. This means ensuring the civil service and contractor community have the core, critical skills for any and all upcoming human spaceflight missions. This also means challenging the community to seek out and demonstrate capabilities to make exploration beyond low Earth orbit (LEO) safer, more affordable, and achievable more quickly.

Appendix A: Membership of the SSTLO
The following is a list of some of the organizations participating in SSTLO activities:

- National
    - Manufacturing Extension Partnership, National Institute of Standards and Technology (NIST), Department of Commerce
    - Employment and Training Administration, Department of Labor
    - Economic Development Administration, Department of Commerce
    - Office of Economic Adjustment, Department of Defense
- Florida
    - Brevard Workforce Development Board
    - Economic Development Commission of Florida's Space Coast
- Louisiana
    - City of New Orleans
    - Louisiana Worker Assistance Program
    - Louisiana Works - Business & Career Solutions Center
- New Mexico
    - New Mexico Regional Development Corp
    - New Mexico Economic Development Commission
    - New Mexico Department of Workforce Solutions
    - New Mexico Industrial Training Board
- Texas
    - Bay Area Houston Economic Partnership
    - Workforce Solutions
    - Houston-Galveston Area Council / Gulf Coast Workforce Board
- Utah
    - Utah Governor's Office of Economic Development
    - Utah Department of Workforce Services
    - Economic Development Corporation of Utah
    - Box Elder County Economic Development Association
    - Brigham City Corporation
- Prime Shuttle Contractors
    - ATK (Alliant Techsystems Inc)—Space Launch Systems
    - Lockheed Martin Space Systems—Michoud Operations
    - Pratt & Whitney Rocketdyne
    - United Space Alliance
- NASA Human Spaceflight Centers
    - Johnson Space Center (JSC), Texas
    - Kennedy Space Center (KSC), Florida
    - Marshall Space Flight Center (MSFC), Alabama
    - Stennis Space Center (SSC), Mississippi

Other Community Partnerships
The Centers have developed unique partnerships with their communities to support the workforce affected by the retirement of the Space Shuttle Program. KSC and JSC both have meetings of the human resource principals—the key human resource managers and leaders from across their local human resource communities. In conjunction with the local Workforce Board, the human resource principals have developed and implemented virtual and live job fairs, resource events, and community databases or websites.

In addition, the KSC Human Resources Office is working closely with the Brevard County Workforce Board organization by developing and delivering training on the Federal employment process and honing

interviewing skills. Also, KSC has opened Workforce Transition Offices—co-located with the Brevard Workforce Office—to provide services such as Federal website navigation, resume writing, and interview skills training.

Appendix B: Human Capital Retention and Transition Tools

NASA has a number of workforce management tools available to retain and transition employees—balancing the needs of the organization and the individual. Some of these tools include:

RETENTION TOOLS

- Retention Incentives-Individual and Groups
- Critical Pay Authority
- NASA Excepted Appointments
- Awards Program
- Temporary Promotions
- Relocation and Redesignation Bonuses
- Workforce Sharing (e.g., matrixing)
- Identify Transition Position Early

TRANSITION TOOLS

- Qualifications Pay
- Relocation and Redesignation Bonuses
- Career Transition Assistance Program
- Workforce Sharing (e.g., matrixing)
- Communication Tools and Strategies
- Individual Training and Development—including Succession Management, Mentoring, and Retraining Programs
- Early Out/Buy Out at End of Shuttle Program
- Trial or Part-Time Retirement

ALTERNATIVE STAFFING TOOLS

- Temporary Hires (less than 1 year)
- Term Hires (1 year or more)
- NASA Excepted Service
- Emergency Appointments
- Re-Employed Annuitants
- Experts and Consultants
- Intergovernmental Personnel Agreements
- Part-Time Employment
- Telecommuting Arrangements
- Rotations/Temporary Duty (TDY)
- Recruitment and Relocation Bonuses

OTHER TOOLS

- Organizational Design (as appropriate)
- Matrix Format (to enable easy transfer of skills between programs)
- Direct Support within Projects for Unique Skills
- Communications Tools and Strategies